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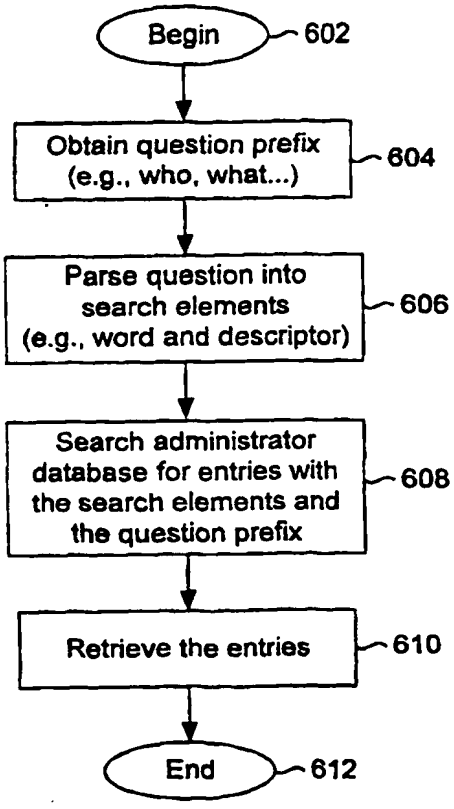
(57) Abstract

A system for information retrieval on the internet requests the information providers, such as web site administrators, to provide characterizing data in the form of questions a user may ask in looking for the information (314). The characterizing data (404) is stored in a database along with the destination data (406) that indicates where the information may be found on the internet. An information seeker may then enter a query in the form of a natural language question (204). The question in the query is then matched against questions stored in the database (608). If there is a match, the associated destination data is employed to retrieve information for the information seeker (610). Both the information seeker and the information providers may also furnish filter values (408, 410) to filter the information retrieved in order to allow the system to provide only the most relevant information to the information seeker.



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INTERNET SEARCHING SYSTEM

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to information retrieval systems. More particularly, the present invention relates to information retrieval systems and methods therefor that harness the multi-user, open-ended nature of the Internet to minimize the costs associated with maintaining such systems while allowing information seekers to find the desired information in an accurate and timely manner.

2. Description of the Related Art

Despite its recent origin, the Internet has rapidly become an important source of information for individuals and businesses. The popularity of the Internet as an information source is due, in part, to the vast amount of available information that can be downloaded by almost anyone having access to a computer and a modem. The Internet's strength also lies in its open-ended nature. That is, the Internet is not supervised or controlled by any person or entity, and anyone having some elementary Internet skills can create and own a web site for the purpose of publishing information thereto. These and other factors have caused an exponential increase in Internet usage and with it, an exponential increase in the volume of information available.

Unfortunately, the overwhelming amount of information available on the Internet also presents formidable challenges to users who wish to rapidly and accurately locate relevant information on the ever-expanding and ever-changing

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Internet. To help users access the information available on the Internet, many different information retrieval techniques have been developed. By way of example, databases have been developed by entities known as search engine companies, which typically employ a large number of people to access, review and categorize the vast number of web pages and web sites on the Internet to facilitate searches by web users. Once the database is built, an Internet user may log on to the search engine's web site and employ a suitable search front end, or user interface, to search through the database in order to identify the catalogued web page(s) or web site(s), which were placed into the database in advance by employees of web engine companies as mentioned earlier. In this sense, the databases created and maintained by the search engine companies function much like the familiar "Yellow Pages" phone books, albeit in electronic form.

To facilitate discussion, the search front end or user interface portion of an exemplary search engine known as Excite!™, which is available on the Internet, is shown in FIG. 1. The user interface, such as that shown in FIG. 1, is typically created by the search engine company, and may be accessed by the information seeker by logging into a designated web site (e.g., the Excite!™ home page). Through the user interface of FIG. 1, the information seeker may enter an appropriate query to allow the search engine to search through the database (not shown) for the purpose of finding the web pages or web sites that contain the information specified by the entered query.

Referring first to FIG. 1, a user may enter in block 102 a query containing key words that best represent the information sought. By way of example, the user may enter the phrase "merced microprocessor" to find, for example, a local dealer for

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computers that employ this Intel-based microprocessor. Depending on how the query is entered, the search engine then parses the query in order to search through the search engine's existing database. In the example of FIG. 1, the phrase "merced microprocessor" in block 102 may be parsed such that the word "merced" creates a first set of hits while the word "microprocessor" creates a second set of hits. In the absence of any Boolean operator, as is in the case of FIG. 1, it may be assumed, for example, that the user wishes to find all web pages or web sites that contain both the term "merced" and the term "microprocessor." Using Boolean operators in search queries is conventional and will not be discussed in great detail here for brevity's sake.

FIG. 1 also illustrates exemplary search results that may be obtained by the Excite!™ search engine from the supplied query "merced microprocessor." As shown, the result of a typical search may include an indication of the number of "hits" (i.e., web sites or web pages that fit or approximately fit the criteria specified by the entered query), a list of web sites that may be deemed by the search engine to be most relevant to the query, and a brief description of each of the web sites displayed.

As shown, the user-submitted query, "merced microprocessor," yields 51871 hits. While seemingly high, this large number of hits is not at all unusual nowadays given the vast, global nature of the Internet and the ease with which web pages and web sites may be added thereto or modified therefrom. In fact, as search engine databases attempt to be as inclusive as possible, the number of hits is likely to increase, not decrease, in the future for a given query.

At some point, the sheer number of hits returned renders the search results less than useful. By way of example, although the exact web site that contains the

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information sought may be found somewhere in the 51,871 web sites and web pages returned in the search results, that relevant web site is essentially buried and may be difficult if not impossible to find in any reasonable amount of time. In fact, a typical user would not and perhaps could not, given time and network constraints, download all possible "hits" to inspect for possible relevance.

In order to alleviate the above searching problem, various search engines available on the Internet may categorize web sites through the use of predefined categories and/or the use of an independent agent. By way of example, one such agent may be programmed to crawl through the web pages of a site to search for repeating terms. Thus, a web site that mentions the phrase "merced microprocessor" ten times may be deemed more relevant by the agent than a web site that merely mentions that phrase once in passing. This data may be stored in the web engine's database and may be employed to sort the hits returned in the search results in order to give the user some information pertaining to the possible relevance of the web sites found by the search engine.

There are, however, disadvantages associated with current Internet information retrieval systems. By way of example, most current Internet search engines accept queries in the form of search terms, which may be qualified by the use of Boolean operators if additional specificity is desired. In the past, such a querying technique was readily understandable to the technically-oriented few who accessed the Internet. Nowadays, however, the Internet may be accessed by people from all walks of life, some of whom may have little or no training in computer searching methodologies. Accordingly, the requirement that searches be conducted by specifying search terms linked by Boolean operators represents a significant obstacle

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to Internet usage.

Further, it is questionable whether there is a direct correspondence between the frequency of usage of a term by a web site and the relevance of that web site to the concept represented by the term. At best, it is an educated guess, albeit a poor one, about the relevance of a particular web site. Note that even though the relevance of a particular web site or web page to a particular concept, term, or keyword may be clearly understood by the information provider (e.g., the creators or administrators of the web sites or web pages), the knowledge of such information providers is not leveraged in any meaningful way by current search engines in determining a web site's relevance during a search. By failing to leverage the knowledge of information providers in ascertaining the relevance of the information found, current Internet information retrieval systems continue to return a high number of false hits or return hits that may have little or no relevance to the information seeker's need.

Even if there is some correspondence between the frequency of usage of a term by a web site and the relevance of that web site to the concept represented by the term, ranking web sites by the frequency with which a particular keyword is mentioned unfortunately encourages "word stuffing." Word stuffing refers to the practice by which web page creators randomly repeat keywords in various locations in the document solely for the purpose of ensuring a high ranking in a search result. The temptation to engage in "word stuffing" may be particularly great for information providers of commercial, for-profit web sites since the revenues derived from those web sites may be tied, either directly or indirectly, to the ability of web users to rapidly locate and access the web sites for information and/or purchases. As the practice of word stuffing becomes more prevalent, the ranking returned in the search

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becomes meaningless as such ranking no longer reflects the true frequency by which a particular keyword is honestly employed in the text of the web site.

There is, however, an even greater problem with current Internet information retrieval systems. As the Internet grows and evolves, the number of web sites and web pages that exist has grown exponentially. At the same time, established web sites and web pages do not stay static and unchanged. Instead, the existing web sites and web pages are modified continually by their owners (i.e., the individuals and businesses that operate the web sites) as the information that need to be communicated changes. These dual problems, coupled with the open nature of the Internet, render it difficult for the current information retrieval model, which relies on efforts of the web search engine employees and resources to keep the database updated, to stay current.

For one, newly created web sites may go unnoticed by an Internet search engine for a long time. An Internet web site or web page may be "missed" by an Internet search engine because it is difficult to access, or because it was created in between crawls by the Internet search engine. Accordingly, the information that is contained in that newly created web site may remain inaccessible to web users until the new web site is "discovered" by the Internet search engine and is included in the database for searching.

Furthermore, even if a web site is already included in the database for searching, changes to the web site may be missed by an Internet search engine for quite a long time, rendering the search result inaccurate. This is because, as a practical matter, Internet search engines have only finite resources, in terms of people and computing power, to cycle through the web sites and web pages of the Internet to

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update its database. In between crawls, the content of a web site may be changed or a web site may be removed by the information provider. However, due to the manner with which databases are currently created and updated by Internet search engines, such changes may go unnoticed for as long as nearly the entire cycle time.

In view of the foregoing, there are desired Internet information retrieval systems and methods therefor that permit information seekers to find the desired information in an accurate and timely manner while minimizing the costs associated with maintaining such systems.

SUMMARY OF THE INVENTION

The present invention relates, in one embodiment, to an information retrieval system and methods therefor that may be employed to search for information on the internet. The information retrieval system permits the multitudes of information providers, such as web site administrators, to submit characterizing data that characterizes the information to be found, which may be a web site, a web page, a specific portion of a web page, or a file containing information. In one embodiment, the characterizing data include questions that the information provider predicts a typical information seeker may ask when searching for the information. The information providers also provide destination data regarding where the information may be obtained, e.g., the URL path to the actual location where the information resides. The characterizing data for the various destinations are then stored in a database, along with the associated destination data. Note that since the information providers are the people who are in control of the information content, leveraging the information providers in this manner ensures that the database is up-to-date and accurate.

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To search for information, the information seeker enters a query, which includes a question in one embodiment. The question in the query is then matched in the database against the questions in the database to find a correspondence or a match. If there is such a correspondence, the associated destination data is employed to retrieve the information from the internet to provide an "answer" to the information seeker. Both the information seeker and the information providers may also furnish filter values to filter the information retrieved in order to allow the system to provide only the most relevant information to the information seeker, which is determined in accordance with the filter criteria.

These and other features of the present invention will be described in more detail below in the detailed description of the invention and in conjunction with the following figures.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a screen shot illustrating an exemplary search query which may be employed to search a conventional Internet search engine (such as Excite!™) and exemplary search results that may be obtained therefrom

FIG. 2A is an exemplary user interface that permits an information seeker to enter one or more questions that may be used to search and retrieve information from the Internet according to one embodiment of the present invention.

FIG. 2B is an exemplary user interface that permits an information seeker to enter a filter selection in order to filter information retrieved from the Internet according to one embodiment of the present invention.

FIG. 3A is an exemplary interface that permits an information provider to enter one or more questions associated with information to be made available on the Internet for retrieval by an information seeker according to one embodiment of the present invention.

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FIG. 3B is an exemplary interface that permits an information provider to enter one or more filter values designed to permit information submitted by the information provider to be filtered upon retrieval by an information seeker according to one embodiment of the present invention.

FIG. 4 is an exemplary database in which information submitted by an information provider may be stored according to one embodiment of the present invention.

FIG. 5 is a diagram illustrating exemplary questions submitted by an information seeker upon parsing of the questions into search terms.

FIG. 6 is a flow diagram illustrating a method for searching the database according to one embodiment of the present invention.

FIG. 7 is a flow diagram illustrating a method for searching the database for entries containing the search elements as shown in step 608 of FIG. 6 according to one embodiment of the invention.

FIG. 8 is a diagram illustrating potential word equivalencies which may be applied during the method for searching illustrated in FIG. 6.

DETAILED DESCRIPTION OF THE INVENTION

In the following description, numerous specific details are set forth in order to provide a thorough understanding of the present invention. It will be obvious, however, to one skilled in the art, that the present invention may be practiced without some or all of these specific details. In other instances, well known process steps have not been described in detail in order not to unnecessarily obscure the present invention.

An invention is described herein that provides an information retrieval system

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that may be applied on the Internet. As will be described in further detail, the invention leverages on the multi-user, open-ended nature of the Internet by allowing those most knowledgeable about the content of a web site or a web page, i.e., the information providers such as the creators or administrators of web pages or web sites, to characterize the content of that web site or web page for search purposes. Information providers will hereinafter refer to any person or entity in control of information desired to be made available for retrieval on the Internet. In one embodiment, the characterizing data includes a question or questions which a typical information seeker may ask when trying to locate the target web page or web site.

Note that the invention does not require that any single person or entity have knowledge or control regarding the content or even existence of all web sites that want to be found. In fact, such knowledge or control is impossible on an open-ended system such as the Internet. Because the invention requests that the information providers themselves (e.g., the creators or administrators of web pages or web sites) provide the characterizing information, the invention advantageously leverages the multi-user nature of the Internet to maintain the database.

It is reasoned by the inventors herein that in the context of the Internet, information providers such as businesses have a strong incentive to want to be found. In fact, some businesses derive a significant portion of their revenue from Internet traffic and thus have a strong incentive to keep the characterizing data updated in the database for users to quickly access their web sites. Accordingly, unlike in a closed-ended system such as a proprietary network in a company where there is little incentive, financial or otherwise, for the information providers to keep the database updated, the Internet paradigm renders it possible to rely on information providers for

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timely updates of the characterizing data for search purposes.

In fact, given the volume of data available on the Internet nowadays, it would be highly impractical to rely on a single administrator or group of administrators at the Internet search engine company to track and characterize the content of all existing web sites and web pages. Thus the Internet paradigm makes it imperative, even necessary, that this characterizing data comes from the information providers themselves. This is particularly true considering the fact that it is always the information provider who is the first to know whether the information in his or her own web site/page has been changed.

Even if there are enough resources for someone other than the information providers themselves to continually crawl all the web sites and web pages to update the characterizing data in the database substantially instantaneously as changes occur, there is still a substantial risk that some web pages would be "missed" during crawls if such web pages are difficult to access (e.g., because of a proprietary access interface, a poorly designed and/or convoluted access path from the home page, or the like). By allowing the information providers themselves to supply the characterizing data and the identity of the web site/page in the database, such access issue is substantially eliminated.

In accordance with one aspect of the present invention, an information seeker (i.e., Internet user) may enter a natural language query to search for these web sites. In one embodiment, the present invention permits a user to search the database through the use of a plain language query in the form of one or more questions. The information retrieval system then matches the user-entered questions to equivalent or similar questions that were supplied by the information providers earlier in the

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database to ascertain the identity (and therefore access path) of the relevant destinations (i.e., web sites, web pages, targets within specific web pages, or files) that contain the information sought.

In addition, the information providers may also include in the characterizing data filtering information that characterizes a destination by its level of sophistication (e.g., complexity or level of education). This filtering information further characterizes the web site or web page since it specifies the sophistication of the target audience of the information provided. Again, requesting the information providers themselves to provide this information leverages the multi-user, open-ended nature of the Internet. If desired, the information seeker may supply, in addition to the query that is used to search for all web sites that has the desired content, filtering data. The filtering data supplied by the information seeker may then be matched against the filter information previously supplied by the information providers to ensure that a given web site not only satisfies the content criteria (specified in the query, which is in the form of a question or questions in one embodiment) but also satisfies the complexity criteria. Thus, the web sites or web pages returned to a consumer looking for information on the Intel-based Merced™ microprocessor to make a computer purchase decision would be different from the web sites or web pages returned to an electronic circuit designer looking to synchronize his designed circuit with the timing requirements of the Merced™ microprocessor (although in terms of content, both deal with the same microprocessor!).

The features and advantages of the present invention may be better understood with the reference to the figures and discussions that follow. FIG. 2A is an exemplary user interface that permits a user to enter one or more questions that may be used to

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search and retrieve information from the Internet according to one embodiment of the present invention. As shown, a prompt 202 may be provided which requests that questions submitted be in plain English. One or more questions may then be entered by an Internet user. Each question 204 indicates information desired to be retrieved from the Internet. By way of example, a first question 204-1 requests information relating to "Who fixes or repairs heat pumps in Eugene, OR?" To assist the user in this process, a pull-down menu may be provided which allows the user to select from the most recently entered questions. Moreover, the searching process is simplified since the user may request information through the use of questions rather than boolean search terms.

A person asking a question in plain English will typically ask a limited number of types of questions. As shown in FIG. 2A, each question typically includes what may be referred to as a question prefix 206. The question prefix 206 may be one of a number of terms such as "who", "what", "when", "why", "where", and "how". By way of example, for the first question 204-1, a first question prefix 206-1 may be "Who." The question prefix 206 for each question submitted by the user may be provided as part of the interface as shown in FIG. 2A. Alternatively, the question prefix 206 may be submitted by the user as part of the question 204. The user may enter any number of questions for a given question prefix. For example, if a user wishes to find a car repair shop in Palo Alto, the user may enter questions such as "Who repairs cars in Palo Alto?" or "Who repairs Mercedes in Palo Alto?" Therefore, various question prefixes may be more desirable than others for various purposes. Moreover, as shown, questions provided by the user may be unrelated as well as related.

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The information and characteristics of the information that is provided on the Internet varies from web site to web site, as well as within each web site. As described above, a search may yield search results that are incompatible with the needs of the Internet user although technically speaking, the content of the information is relevant to the query. An example of this is when a technically unsophisticated consumer is furnished with highly technical information pertaining to the arithmetic logic unit (ALU) of the Intel-based Merced™ microprocessor in response to the question "what is a merced microprocessor.?" The user may therefore wish to further filter the search results that may be obtained through the use of the previously entered questions.

FIG. 2B is an exemplary user interface that permits a user to enter a filter selection in order to filter information retrieved from the Internet according to one embodiment of the present invention. The optional filter selection may be used for a variety of purposes to filter the information that is retrieved. By way of example, the filter selection may be used to specify one or more levels of complexity for the information that is ultimately retrieved. As yet another example, the filter selection may be used to specify one or more educational levels for which the information retrieved will be most appropriate. Thus, children in grammar school searching for information may obtain an "answer" to their question that is most suitable for their purposes. Similarly, a graduate student doing research on the same or a similar topic may obtain information on that topic of a higher level of detail and complexity.

As shown in FIG. 2B, a first exemplary filter selection 208 designed to filter the information desired to be retrieved is illustrated. The first filter selection 208

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permits the user to specify at least one educational level associated with the information desired to be retrieved. As shown, one or more educational levels 210 from which to select the first filter selection 208 may be provided to the user. By way of example, the educational levels 210 may include pre-kindergarten, kindergarten – 5th grade, 6th grade – 12th grade, college, post collegiate, or all of the above. By way of example, the educational levels 210 provided may be used to indicate the user's ability or inability to read English. The user may then specify one or more selections 212 from these educational levels 210. By way of example, the user may mark a box corresponding to the appropriate educational levels 210.

In addition, a second exemplary filter selection 214 designed to filter the information desired to retrieved is shown. The second filter selection 214 permits the user to specify at least one complexity, or technical, level associated with the information desired to be retrieved. As shown, one or more complexity or technical levels 216 from which to select the second filter selection 214 may be provided to the user. By way of example, the complexity or technical levels 216 may include very easy, easy, average, complex or technical, very complex or technical, or include all levels. By way of example, for a user searching for information on "nurseries", the level "very easy" may yield information related to children's nurseries rather than gardens. Thus, these complexity or technical levels 216 may be associated with the subject matter of the information being retrieved. The user may then specify one or more selections 218 from these complexity or technical levels 216. As described above, the user may designate one or more selections corresponding to the desired levels 216 using a mouse or other device. Moreover, such filter selections may be exclusive as well as inclusive. Similarly, expressions such as boolean or

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mathematical expressions may be used during the filtering process. By way of example, boolean expressions may be applied to select information that is appropriate for both a 6th grader AND a college graduate. As yet another example, mathematical expressions may be applied to select information that is appropriate for a 6th grader or someone who is LESS educated. Although only two exemplary filter selections are described above, further options may be provided to the user such as those which would specifically permit access to, or deny access to, pornographic material.

Filter selections may be used for a variety of purposes. For instance, such a filtering mechanism may be used to provide parents with the ability to set these filter selections such that pornographic or other inappropriate material cannot be accessed by their children. By way of example, this may be accomplished through providing a separate user interface which allows the filter selections to be set. As yet another example, the filter selections may be updated through the use of a password or other protected mechanism. Therefore, the age appropriateness and complexity of the content of various web sites or information made available on the Internet may be filtered according to the user's specifications. In addition, further filtering mechanisms may be applied to obtain different categories of information (e.g., states, distance from the user). Appropriate links, therefore, may be performed to obtain and access additional information required for the particular category (e.g., mapping programs). Accordingly, the search may be tailored to the specific needs of the Internet user.

Each question entered by the user and associated filter selections may then be accepted upon submittal of the query 220 by the user. A database containing

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information submitted by one or more information providers may then be searched for information related to the submitted query. Upon completion of the search, an "answer" to the question is provided to the user.

As described above, it would be unwieldy to search through all web sites on the Internet. Therefore, a database is maintained by a central service that provides access to the present invention. Rather than contain information related to all web sites on the Internet, this database contains entries for only those web sites or "targets" (i.e., destinations) submitted by information providers. More particularly, these entries associate a web site or "target" with one or more questions submitted by an information provider. It is important to recognize that the information provider is in the best position to judge the content (e.g., complexity) of a particular web site or target. Moreover, the information provider would have an interest in assisting an Internet user in locating the particular web site. In addition, the information provider is in the best position to predict the type of question the average consumer might ask. Therefore, the information provider (i.e., creator of the web site) may create appropriate questions and filter values characterizing the web site or information submitted to the service. These questions, filter values, and the corresponding destination (e.g., web site) may then be furnished by the information provider to the service for entry into the system database.

FIG. 3A is an exemplary interface that permits an information provider to enter one or more questions associated with information to be made available on the Internet for retrieval by a user according to one embodiment of the present invention. As shown, a prompt 302 is provided which requests that the information provider

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submit questions characterizing a particular destination 304. As described above, the destination 304 contains an answer to those questions provided by the information provider. The destination 304 may therefore serve as a potential target for the search performed by the Internet user. The destination 304 may include a URL for a web site 306, a web page or file 308, a target or position within the web page 310 (e.g., paragraph), or a file containing contact information 312 which may be entered in a scrolling window, as shown. One or more questions may be entered by the information provider for each destination. Each question 314 may therefore be associated with information desired to be made available on the Internet for retrieval. By way of example, a first question 314-1 correlates with information relating to "Who fixes or repairs heat pumps in Eugene, OR?" Accordingly, information providers may furnish questions that are most likely to be asked by a user while searching the Internet. Moreover, multiple variations of the same question may be supplied to increase the probability that the search will be successful. Similarly, multiple questions may be used to cover varying scopes of the same question. By way of example, a user may ask "What are the best restaurants in the Bay Area?" as well as "What are the best restaurants in San Francisco?"

As shown in FIG. 3A, each question may include a question prefix 316. The question prefix 316 may be one of terms such as "who", "what", "when", "why", "where", and "how". By way of example, for the first question 314-1, a first question prefix 316-1 may be "Who." The question prefix 316 for each question submitted by the information provider may be provided as part of the interface as shown in FIG. 3A. Alternatively, the question prefix 316 may be submitted by the information provider as part of the question 314. The information provider may enter any number

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of questions for a given question prefix. For example, as shown, if an information provider wishes to make information related to heat pumps available on the Internet, a variety of questions associated with such information may be entered and linked to this information through the use of the present invention.

The information provider may enter one or more optional filter values to designate the appropriate audience for the particular destination provided by the information provider. As described above, these corresponding filter values may be exclusive as well as inclusive. In this manner, the information may be filtered upon retrieval by a user upon the matching one or more of the questions submitted by the information provider. FIG. 3B is an exemplary interface that permits an information provider to enter one or more filter values designed to permit information submitted by the information provider to be filtered upon retrieval by a user according to one embodiment of the present invention. More particularly, filter values submitted by the information provider are designed to filter the information according to the user provided filter selection. By way of example, a filter value may be used to specify one or more levels of complexity (e.g., technical levels) that characterize the information that is submitted by the information provider. As yet another example, a filter value may be used to specify one or more educational levels to indicate the age or educational level for which the information will be most appropriate.

As shown in FIG. 3B, a first exemplary filter value 318 designed to characterize the information submitted by the information provider is illustrated. The first filter value 318 permits the information provider to specify at least one educational level associated with the information. As shown, one or more educational

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levels 320 from which to select the first filter value 318 may be provided to the information provider. The information provider may then specify one or more selections 322 from these educational levels 320.

In addition, a second exemplary filter value 324 designed to characterize the information submitted by the information provider and facilitate later retrieval of the information is shown. The second filter value 324 permits the information provider to specify at least one complexity, or technical, level associated with the information submitted. As shown, one or more complexity or technical levels 326 from which to select the second filter value 324 may be provided to the information provider. The information provider may then specify one or more selections 328 from these complexity or technical levels 326. As shown, the filter values specified by the information provider are selected from choices made available to the user upon specifying the corresponding filter selections, as described above. In this manner, information submitted to the search service by the information provider may be appropriately "categorized" according to these filter values to permit later retrieval by a user.

Each question entered may then be associated with the filter values and the destination as specified by the information provider. FIG. 4 illustrates an exemplary database engine in which information submitted by the information provider may be stored according to one embodiment of the present invention. As shown, the database may include a plurality of entries. Each one of the plurality of entries 402 may store a question 404 submitted by the information provider, a destination 406 containing an "answer" to the question 404, and one or more optional filter values such as

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complexity 408 and education 410. In this manner, the filter values 408, 410 and the destination 406 may be associated with the question 404. As described above, each question may include a question prefix. Since searching is performed through the database maintained by the searching service rather than through the entire Internet, search time is substantially less than that of standard Internet search engines. Moreover, since the database is a compilation of information submitted by the web site creators, the information is most likely to be retrieved in the manner desired by both the web site creators and the user requesting the information.

Each information provider may submit its information to the Internet search service for retrieval by Internet users. A service fee may be charged upon submission of the information by the information provider or per kilobyte of memory required to store the entries in the database. Moreover, the service fee may be charged upon access of the information by an Internet user.

FIG. 5 is a diagram illustrating exemplary questions submitted by a user upon parsing of the questions into search terms. By way of example, a question 502, "Who repairs Hondas in Palo Alto?" may be parsed into appropriate terms and phrases, as shown. The database may then be searched using these terms and phrases.

Each question submitted by the user may be parsed and used to search a database for the appropriate information. FIG. 6 is a flow diagram illustrating a method for searching the database according to one embodiment of the present invention. The process begins at step 602. The question may be parsed into its question prefix at step 604 and a plurality of search elements at step 606. By way of example, each of the search elements may be parsed such that each term or phrase is

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associated with an appropriate descriptor (e.g., verb or noun). The database may then be searched at step 608 for at least one entry associated with the question prefix and the plurality of search elements obtained in steps 604 and 606. To facilitate efficient searching and retrieval, the database may be a relational database which may be indexed prior to searching. In this manner, similar entries (e.g., questions) may be efficiently located. The selected entries may then be retrieved at step 610. The process is completed at step 612.

One method for searching the database as shown in step 608 of FIG. 6 is illustrated in FIG. 7. As shown, FIG. 7 is a flow diagram illustrating a method for searching the database for entries, or questions, containing the search elements according to one embodiment of the invention. As shown, the method begins at step 702. Entries having the desired parsed question prefix may be obtained from the database at step 704. A next one of the search elements may then be obtained from the parsed question at step 706. A search is then performed within the obtained entries for the next one of the search elements at step 708. At step 710, if it is determined that a search has been performed for all parsed search elements, the process is completed at step 712. Alternatively, if a search has not been performed for all parsed search elements, the process is repeated for each remaining parsed search element at step 706. Although the search is described as being performed consecutively for each parsed question prefix and search element, searches may be performed in parallel. During the search, the relevant entries may be ranked according to the number of associations between the search terms and the selected database entries. Similarly, irrelevant entries may be eliminated from consideration.

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Once the appropriate entries are retrieved, the "answer" associated with question may be provided. Where a large number of entries are retrieved, a set of the retrieved entries may be selected. By way of example, it may be preferable to select a percentage of the entries. This selected set of entries may be selected according to various criteria such as relevance of the entries to the user provided question. The relevance of the entries may be determined through comparing the number of search terms that are the same or equivalent to the parsed terms in the user provided question. Thus, it may not be necessary to obtain an exact match between the question submitted by the information provider and the question entered by the user.

Rather than submitting numerous variations of the same question, the information provider may wish to define one or more sets of equivalent terms. These equivalent terms may be applied during searching, retrieval of entries from the database, and ranking of the retrieved entries. FIG. 8 is a diagram illustrating potential word equivalencies. By way of example, when a parsed term, "information", is searched in the service database, the terms "data" and "news" may be interchangeable. In this manner, the question provided by the user need only be "equivalent" to a question provided by an information provider, rather than identical. By way of example, if a user wishes to obtain information relating to restaurants in the Midwest, "Midwest" may be associated with states in the Midwest to facilitate the searching process. Moreover, these equivalent terms may be assigned different values to permit ranking of the entries prior to providing the information to the Internet user.

The present invention provides an accurate and efficient system for providing an Internet user with requested information. Since a user may enter a natural

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language query in the form of a question, the system is user-friendly to a wide audience of computer users. Moreover, the knowledge and experience of the creator of the web site is most effectively leveraged to compile and maintain a system database such that subsequent searches are the most accurate and effective. As a result, "false hits" that typically occur during the use of standard Internet search engines may be substantially reduced through the use of the present invention. Therefore, it is unnecessary for the Internet search service to research or crawl the web sites that are submitted to the service. As a result, administrative support that must be provided by the service is minimized. Moreover, real-time updates may be made to the database to permit information to be efficiently and accurately retrieved.

The invention can also be embodied as computer readable code on a computer readable medium. The computer readable medium is any data storage device that can store data which can thereafter be read by a computer system. Examples of the computer readable medium include read-only memory, random-access memory, CD-ROMs, magnetic tape, and optical data storage devices.

Although illustrative embodiments and applications of this invention are shown and described herein, many variations and modifications are possible which remain within the concept, scope, and spirit of the invention, and these variations would become clear to those of ordinary skill in the art after perusal of this application. For instance, the present invention is described as permitting retrieved information to be filtered according to the complexity of the information as well as the selected educational levels. However, it should be understood that the present invention is not limited to this arrangement, but instead would equally apply

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regardless of the categories in which the information is filtered. Accordingly, the present embodiments are to be considered as illustrative and not restrictive, and the invention is not to be limited to the details given herein, but may be modified within the scope and equivalents of the appended claims.

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CLAIMS

What is claimed is:

1. A computer implemented method implemented in an information retrieval system for providing first information via the Internet to an information seeker, comprising:

receiving a query from said information seeker via said Internet;

comparing said query with a database of characterizing data entries, said characterizing data entries representing characterizing data items previously submitted to said information retrieval system by information providers for storing within said database, said information providers representing entities wishing to provide information through said Internet to Internet users, each of said characterizing data items being associated with at least one destination data item; and

if a correspondence between said query and a first characterizing data entry of said characterizing data entries in said database is found, employing a first destination data item associated with said first characterizing data entry to provide said information seeker with said first information.

2. The computer-implemented method of claim 1 wherein said information providers represent entities other than said information retrieval system.

3. The computer-implemented method of claim 1 wherein said information providers includes entities, other than an entity implementing said computer-implemented method, that are responsible for updating contents of websites and

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webpages containing information to be accessed by said Internet users.

4. The computer-implemented method of claim 1 wherein said information providers represent administrators of websites coupled to said Internet.

5. The computer-implemented method of claim 4 wherein said websites are different from the website implementing said information retrieval system.

6. The computer-implemented method of claim 1 wherein said first destination data item is a Uniform Resource Locator (URL) for a webpage.

7. The computer-implemented method of claim 1 wherein said first destination data item is a Uniform Resource Locator (URL) pointing to a specific portion of a webpage.

8. The computer-implemented method of claim 1 wherein said first destination data item is a data file retrieved from a website external to a website implementing said computer-implemented method.

9. The computer-implemented method of claim 1 wherein said first destination data item is associated with more than one of said characterizing data entries.

10. The computer-implemented method of claim 1 wherein said query is in the form of a question.

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11. The computer-implemented method of claim 1 wherein said characterizing data entries include data entries in a question format.

12. The computer-implemented method of claim 1 wherein said characterizing data entries are associated with filtering data.

13. The computer-implemented method of claim 12 wherein said first characterizing data entry include entries pertaining to equivalent terms, said equivalent terms representing terms that are different but deemed by an information provider associated with said first characterizing data entry to be equivalent to a term in said first characterizing data entry, said equivalent terms causing said comparing to produce said correspondence if a term in said query matches one of said equivalent terms even if an exact match between said term in said query and said term in said first characterizing data entry is not found.

14. The computer-implemented method of claim 12 wherein filtering data associated with a given one of said characterizing data entries includes data pertaining to a level of technical sophistication of information associated with a given destination data item, said given destination data item being associated with said given one of said characterizing data entries in said database.

15. The computer-implemented method of claim 12 wherein filtering data associated with a given one of said characterizing data entries includes data pertaining

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to a level of education appropriate for information associated with a given destination data item, said given destination data item being associated with said given one of said characterizing data entries in said database.

16. A computer-implemented method for deriving revenue from Internet information providers responsive to queries by Internet users, comprising:

receiving characterizing data entries submitted by said Internet information providers, each of said characterizing data entries correspond to at least one destination data item;

storing said characterizing data entries in a database;

receiving, via the Internet, a query from said information seeker, said information seeker being one of said Internet users;

comparing said query against said characterizing data entries for a correspondence; and

if said comparing produces a correspondence between said query and a first characterizing data entry of said characterizing data entries, charging a first Internet information provider of said Internet information providers a given amount, said first Internet information provider being associated with said first characterizing data entry.

17. The computer-implemented method of claim 16 further comprising employing a first destination data item associated with said first characterizing data entry to provide information to said information seeker.

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18. The computer-implemented method of claim 16 wherein said Internet information providers represent administrators of websites coupled to said Internet.

19. The computer-implemented method of claim 16 wherein said first destination data item is a Uniform Resource Locator (URL) for a webpage.

20. The computer-implemented method of claim 16 wherein said first destination data item is a Uniform Resource Locator (URL) pointing to a specific portion of a webpage.

21. The computer-implemented method of claim 16 wherein said first destination data item is a data file retrieved from a website external to a website implementing said computer-implemented method.

22. The computer-implemented method of claim 16 wherein said first destination data item is associated with more than one of said characterizing data entries.

23. The computer-implemented method of claim 16 wherein said query is in the form of a question.

24. The computer-implemented method of claim 16 wherein said characterizing data entries include data entries in a question format.

25. The computer-implemented method of claim 24 wherein said first

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characterizing data entry include entries pertaining to equivalent terms, said equivalent terms representing terms that are different but deemed by said first Internet information provider to be equivalent to a term in said first characterizing data entry, said equivalent terms causing said comparing to produce said correspondence if a term in said query matches one of said equivalent terms even if an exact match between said term in said query and said term in said first characterizing data entry is not found.

26. The computer-implemented method of claim 16 wherein said characterizing data entries are associated with filtering data.

27. An information retrieval system for providing first information via the Internet to an information eeker, comprising:

means for receiving characterizing data entries and associated destination data items submitted by information providers, said information providers representing entities wishing to provide information through said Internet to Internet users;

means for storing said characterizing data entries and said associated destination data items, each of said characterizing data items being associated with at least one of said associated destination data items;

means for receiving a query from said information seeker via said Internet; and

means for comparing said query with said characterizing data entries to find a correspondence between said query and a first characterizing data entry of said characterizing data entries.

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28. The information retrieval system of claim 27 further including means for employing a first destination data item associated with said first characterizing data entry to provide said information seeker with said first information if there is a correspondence between said query and said first characterizing data entry of said characterizing data entries.

29. The information retrieval system of claim 27 wherein said information providers represent administrators of commercial websites coupled to said Internet.

30. The information retrieval system of claim 29 wherein said websites are different from a website implementing said information retrieval system.

31. The information retrieval system of claim 27 wherein said first destination data item is a Uniform Resource Locator (URL) for a webpage.

32. The information retrieval system of claim 27 wherein said first destination data item is a Uniform Resource Locator (URL) pointing to a specific portion of a webpage.

33. The information retrieval system of claim 27 wherein said first destination data item is a data file retrieved from a website external to a website implementing said information retrieval system.

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34. The information retrieval system of claim 27 wherein said first destination data item is associated with more than one of said characterizing data entries.

35. The information retrieval system of claim 27 wherein said query is in the form of a question.

36. The information retrieval system of claim 27 wherein said characterizing data entries include data entries in a question format.

37. The information retrieval system of claim 36 wherein said characterizing data entries are associated with filtering data.

38. The informatic ı retrieval system of claim 36 wherein said first characterizing data entry include entries pertaining to equivalent terms, said equivalent terms representing terms that are different but deemed by an information provider associated with said first characterizing data entry to be equivalent to a term in said first characterizing data entry, said equivalent terms causing said comparing to produce said correspondence if a term in said query matches one of said equivalent terms even if an exact match between said term in said query and said term in said first characterizing data entry is not found.

39. The information retrieval system of claim 37 wherein filtering data associated with a given one of said characterizing data entries includes data pertaining to a level of technical sophistication of information associated with a given destination data

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item, said given destination data item being associated with said given one of said characterizing data entries in said database.

40. The information retrieval system of claim 37 wherein filtering data associated with a given one of said characterizing data entries includes data pertaining to a level of education appropriate for information associated with a given destination data item, said given destination data item being associated with said given one of said characterizing data entries in said database.

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Poll: Nicotine Junkies?
Meet Your Match
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FIG. 1

202

Ask your question(s) below: IN PLAIN ENGLISH

Fill in Any or All Queries.

206 WHO: 206-1

204 fixes or repairs heat pumps in Eugene, OR? 204-1

WHAT:

is a Merced Microprocessor?

WHEN:

was digital cable offered in Eugene, OR?

WHY:

does my Hewlett Packard printer misfeed paper?

WHERE:

can I buy a used BMW in the Northwest?

HOW:

can I drill through metal?

FIG. 2A

BNSDOCID: <WO___0026762A1_I_>

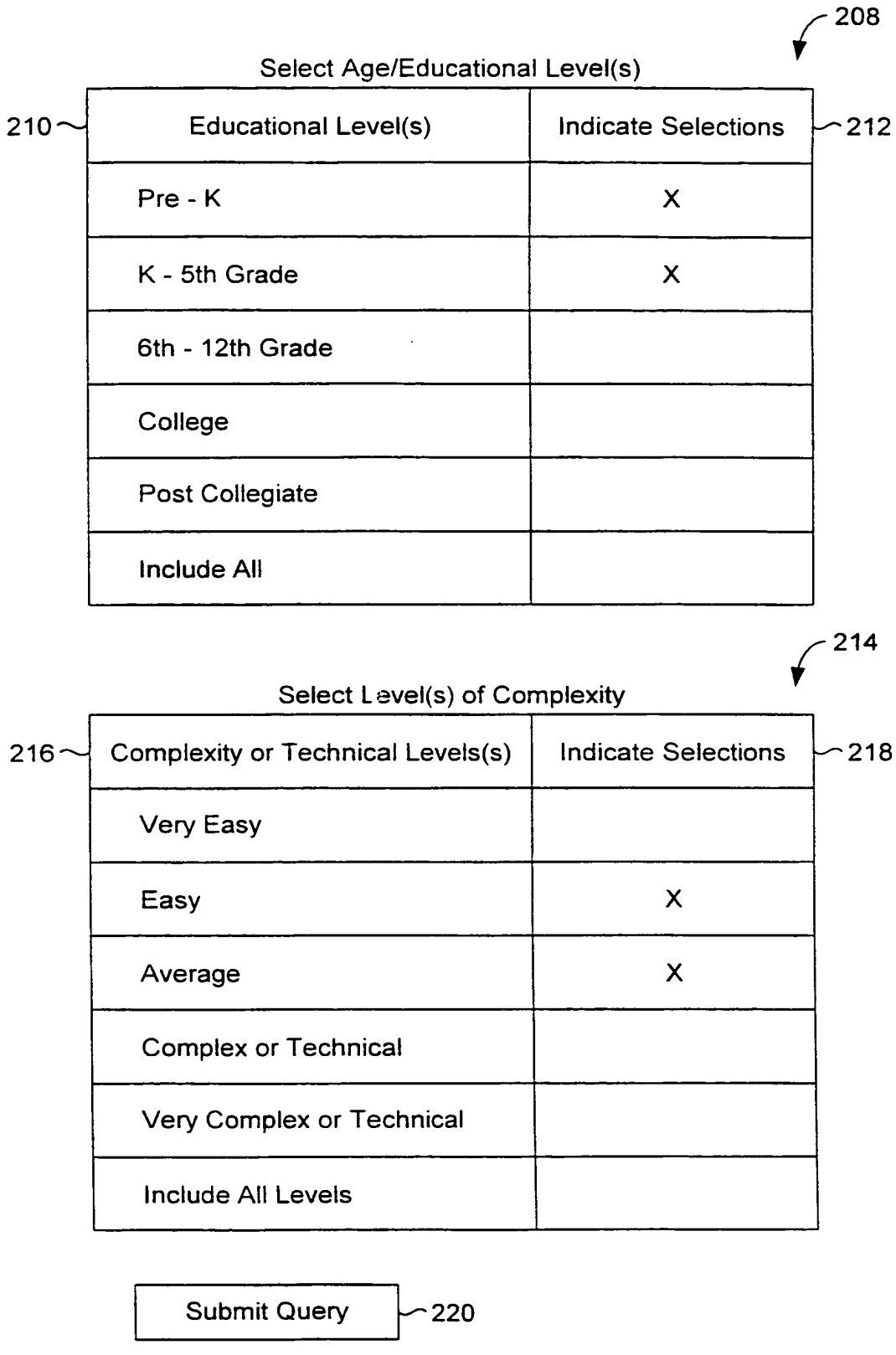

FIG. 2B

BNSDOCID: <WO___0026762A1_I_>

302

Please submit as many questions per category as you want for the following destination

304
306 Website: http://www.website.com
308 Webpage: http://www.website.com/specificpage.html
310 Target within webpage: http://www.website.com/specific page/#specifictarget.html
312 File/contact info.

316-1 WHO: ~ 316

314-1 fixes or repairs heat pumps in Eugene, OR? ~ 314

WHAT:

is a heat pump?

WHEN:

does a heat pump need to be serviced?

WHY:

does my heat pump make a rattling sound?

WHERE:

can I buy a heat pump in Eugene, OR?

HOW:

do I change a fuse on a heat pump?

FIG. 3A

BNSDOCID: <WO___0026762A1_I_>

318

Select Age/Educational Level(s)

320 Educational Level(s)	Indicate Selections 322
Pre - K	
K - 5th Grade	
6th - 12th Grade	
College	
Post Collegiate	
Include All	

324

Select Level(s) of Complexity

326 Complexity or Technical Levels(s)	Indicate Selections 328
Very Easy	
Easy	
Average	
Complex or Technical	
Very Complex or Technical	
Include All Levels	

FIG. 3B

BNSDOCID: <WO___0026762A1_I_>

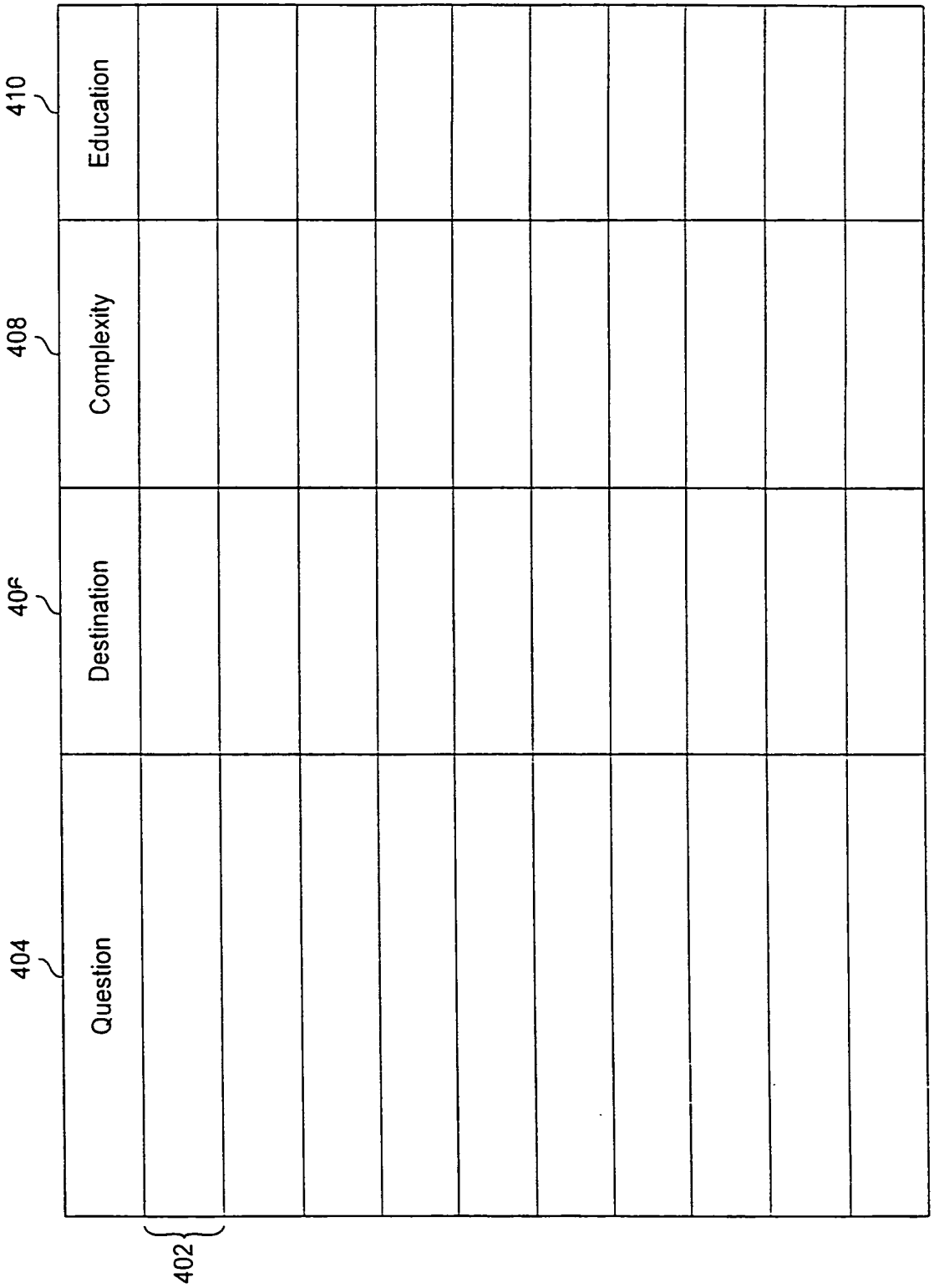

FIG. 4

BNSDOCID: <WO___0026762A1_I_>

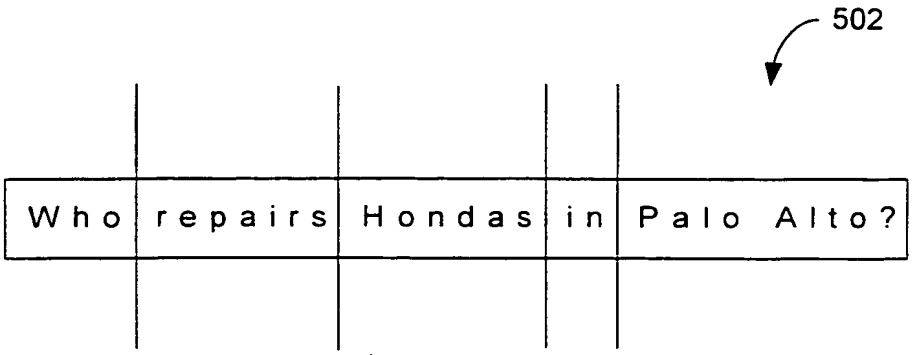

FIG. 5

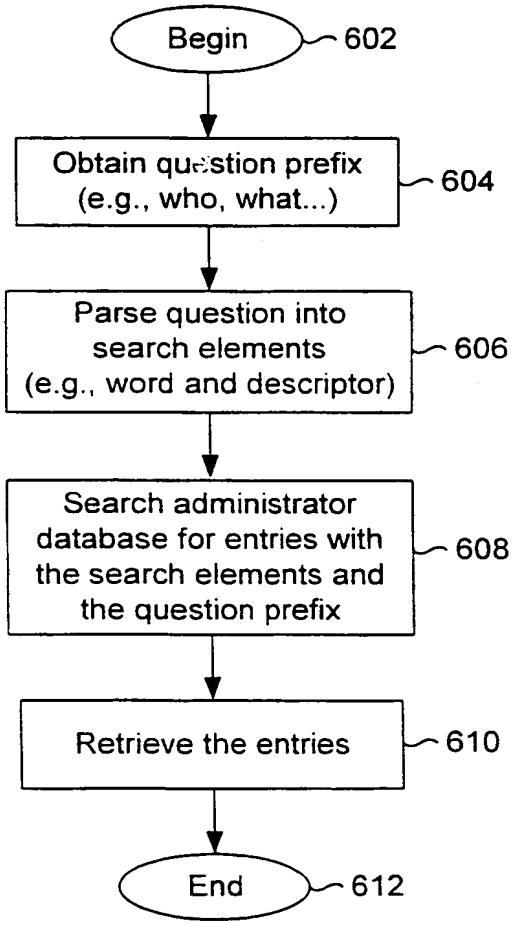

FIG. 6

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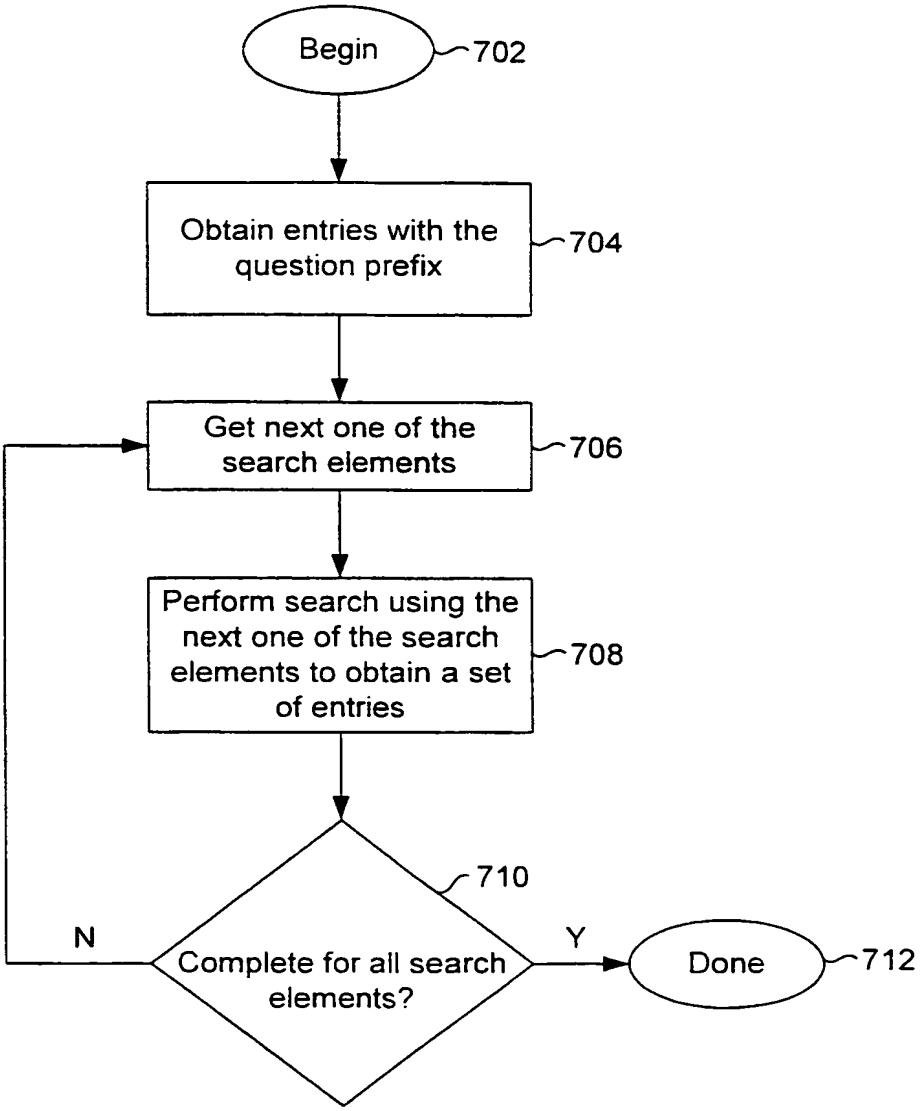

FIG. 7

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SUBSTITUTE SHEET (RULE 26)

a	the	an	or					
about	for	around						
bake	cook	broil	roast	boil	fry	stir-fry	stir fry	baste
begin	start	initiate						
buy	locate	purchase	procure	get	find	search	accumulate	
can	may	will	do	does				
car	auto	automobile	roadster	speedster	race car	funny car	stock car	
cash	dollars	cents	marks	francs	pesos	pounds		
die	dead	deceased	passed away					
distribute	sell	franchise	produces	makes				
doctor	physician	pediatrician	surgeon	neurologist	internist	podiatrist	opthamologist	optometrist
easy	simple	plain						
equipment	material							
every	all	each	everything					
gift	present	award						
health	healthy	healthful						
hurt	ill	pain	upset	discomfort	sick	sickly		
I	we	us						
information	data	news						
is	an	the	or	them				
in	at	around	through	to				
live	alive	well						
make	create	construct	build	produce	cause	create		
much	many							
own	possess							
show	display							
stop	end	finish	complete	final	terminate			
transfer	move							
truck	pickup truck							
unique	special							
work	function	operate	go					
fix	repair	correct						

FIG. 8

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US99/25504

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :G06F 7/00, 15/16
US CL : 707/10; 709/217

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 707/1,3,4,10; 709/203, 217, 218, 219

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Microsoft Press Computer Dictionary

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WEST, EAST, yahoo
search terms: describ?, url, database

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y,E	US 5,991,756 A (WU) 23 November 1999, col. 4, line 50 - col. 8, line 29	1-40
Y	HONEYCUTT, J., Special Edition Using the Internet, Fourth Edition, Chapter 14: Using the Major Search Engines, Macmillan Computer Publishing, December 1997, pages 13-14	1-40
A,E	US 6,0[illegible]9,409 A (ADLER et al.) 28 December 1999, abstract	1-40
A,E	US 5,995,961 A (LEVY et al.) 30 November 1999, abstract	1-40
A,P	US 5,951,642 A (ONOE et al.) 14 September 1999, abstract	1-40

[X] Further documents are listed in the continuation of Box C. [ ] See patent family annex.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US99/25504

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A,P	US 5,893,091 A (HUNT et al.) 06 April 1999, abstract, especially col. 11, line 59 - col. 12, line 24	1-40
A	author unkown, What is Ask Jeeves?, http://www.askjeeves. com, April 1997	1-40
A	author unkown, Yahoo! How to Suggest Your Site, http://www.yahoo.com, December 1994, 2 pages	1-40
A	author unkown, Yahoo! How To .. Suggesting sites to Yahoo!, http://www.yahoo.com, December 1994, 8 pages	1-40

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